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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,639	03/10/2004	David O'Connor	2500495-991101	6690
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DLA PIPER RUDNICK GRAY CARY US, LLP 2000 UNIVERSITY AVENUE E. PALO ALTO, CA 94303-2248			EXAMINER LIU, SUE XU	
			ART UNIT	PAPER NUMBER
			1639	

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/798,639

Applicant(s)

O'CONNOR ET AL.

Examiner

Sue Liu

Art Unit

1639

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 8/29/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) 22, 25, 47, 50, 53 and 54 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21, 23, 24, 26-46, 48, 49, 51 and 52 is/are rejected.
- 7) ☒ Claim(s) 9 and 34 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 and 9/3/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of Group I in the reply filed on 8/29/2005 is acknowledged. The traversal is on the ground(s) that Group I and II (including Claims 1-54) should have been grouped together as all of these claims are directed to a device for performing chemical reactions and a search of all the claims in Group I would also encompass the search for Group II claims. This is found persuasive, and therefore restriction between Group I and II is withdrawn. Thus, Claims 1-54 are grouped together.

2. Applicant's non-election of inventions of Groups III-VII without traverse in the reply filed on 8/29/2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 55-82 of Groups III-VII are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to nonelected inventions of compositions and methods, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 8/29/2005.

3. Applicant elected **without** traverse of the following species:

A. Borosilicate glass;

B. 7.5 nanometers;

C. alkylthoils;

Art Unit: 1639

- D. gold;
- E. aluminum;
- F. conductive epoxy; silver epoxy;
- G. hydrophobic layer;
- H. bar code marker;
- I. aluminum reflective surface;
- J. plastic non-reflective surface;
- K. ligation reactions;
- L. three components;
- M.  $\text{H}_2\text{SO}_2$ ;
- N. hydrofluoric acid;
- O. patterned mask;
- P. suspension of solids;
- Q. small molecule probe;
- R. peptide compounds.

Claims 22, 25, 47, 50, 53 and 54 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 8/29/2005.

4. Claims 1-54 are currently pending;

Claims 22, 25, 47, 50, 53, and 54 have been withdrawn;

Claims 1-21, 23, 24, 26-46, 48, 49, 51 and 52 are being examined in this application.

***Priority***

5. This application claims priority to provisional application 60/453,932 filed on 03/11/2003.

***Claim Objections***

6. Claims 9 and 34 are objected to because of the following informalities: The word “portion” is misspelled in the claims. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-21, 23, 24, 26-46, 48, 49, 51 and 52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The instant claims briefly recite a device comprising various defined structures on a substrate. The structures of the device are not clearly and unambiguously described as such so that an ordinary skilled artisan can reasonably interpret the claimed subject matter. Claims 1 and 27 both recite a substrate having “a first side”, and “a second side,” which could be readable as two different surfaces existing in two different planes, or interpreted as the left and the right sides on the same surface. In Claim 1, the ambiguity arises where parts (a) through (d) could be limiting on either the microwell or the porous region. In addition, the specification and the drawings of the instant application are also ambiguous when defining the structures of the

Art Unit: 1639

claimed device. For example, in Figure 1, the reference number 14 and 16 could be pointing to the different sides of the same surface or two different surfaces. Furthermore, Claim 7 recites “a cavity located on the second side of the substrate...”, which is not clearly defined as part of the microwell or as another structure on the substrate. Thus, the claimed invention could be readable on different and distinct devices due to various interpretations on its structural limitations. Because of the aforementioned ambiguities, the instant claims failed to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

***Claim Rejections - 35 USC § 102***

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 2, 3, 4, 7-12, 17, 20, 21, 26, 27-29, 30, 33-37, 42, 45, 46, 48, 51 and 52 are rejected under 35 U.S.C. 102(b) as being anticipated by Beattie et al (US Patent 5,843,767; 1998).

The instant claims briefly recite a device (micro-array or -chip) generated from a substrate comprising at least two sides, an array of microwells (comprised of cavities), and porous regions (readable on pores and channels) within each of the microwells. The cavities of the microwells intersect with the porous regions, and form channels through the substrate. Each of the microwells has the inherent property and/or function of forming an ion bridge since liquids and salts can flow through the formed channel.

Beattie teaches a microfabricated apparatus for conducting a multiplicity of individual and simultaneous binding reactions. The reference specifically teaches a device comprising the followings (See Claim 1 and 20 of the reference; Figure 1A and 1B, which depicts the “use of an

Art Unit: 1639

array of tapered sample wells that comprise...porous wafer...” as recited in Column 9, lines 1-9.):

A.) a substrate (which could be either glass or silicon as recited in Claims 11 and 29 of the reference) having oppositely facing first and second major surfaces (would refer to the first and second sides of the instant claims);

B.) a multiplicity of discrete channels extending through said substrate from said first major surface to said second major surface (would refer to the arrays of microwells and porous regions);

C.) a first binding reagent (which could be DNA, proteins, ligands etc. Claims 16, 17, 34 and 35 of the reference) immobilized on the walls of the channels (would refer to at least one component of a chemical reaction is immobilized on the porous region);

D.) further comprising a rigid support (which comprises wells; claim 23 of the reference) that is integral to the substrate.

The reference further teaches the substrate is “made of oriented array microporous silicon” or “nanochannel glass” (would refer to porous regions). (See Claims 13 and 30 of the reference.) The reference also teaches the diameters of the channels within a nanochannel glass could range from 33 nm to several micrometers. (See Column 9, lines 50-55; Claim 4 of the reference.) Together, these would refer to the device having two sides, an array of microwells, and porous regions within the wells. Furthermore, the reference teaches derivatizing the surface of the glass substrate with epoxysilane (Claims 19 and 37 of the reference), which would refer to “a reactive monolayer deposited thereon.” The reference also teaches oligonucleotides are fixed in the isolated and discrete regions on the substrate through layer of platinum or gold substrate

Art Unit: 1639

derivatized with a dithioalkane (Column 6, paragraph (k)), which would refer to the “organothiol molecules covalently bonded to a metallic layer” as well as the device “comprising at least one component of a chemical reaction.” In addition, the reference teaches the substrate (in the form of a wafer) is packaged within a 2 mm x 4 mm polypropylene frame serving as an upper reservoir and structure for handling. (See Example 6 in Column 15 of the reference) This would refer to a hydrophobic containment layer. Since the reference teaches the device is in an array format, the position of each of the well is spatially defined (referring to a means for conveying information about the location of the microwells).

Thus, the reference clearly anticipates the claimed invention.

9. Claims 1 and 2 are rejected under 35 U.S.C. **102(e)** as being anticipated by Tso et al (US Patent 6,635,226).

The instant claims briefly recite a device (micro-array or –chip) generated from a substrate comprising at least two sides, an array of microwells (comprised of cavities), and porous regions (readable on pores and channels) within each of the microwells.

Tso et al teach a microanalytical device comprising the followings (See Claim 1 of the reference):

a.) a substrate from materials that are not silicon based, having first and second substantially planar opposing surfaces (would read on the two sides of the substrate of the instant claims).



Art Unit: 1639

b.) the said substrate having a cavity and at least one microchannel formed in the first planar surface, wherein the cavity serves as a reaction that is fluid communication with each microchannel. This would refer to the microwells and porous regions.

Thus, the reference clearly anticipates the claimed invention.

*Claim Rejections - 35 USC § 103*

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-21, 23-46, and 48-52 are rejected under 35 U.S.C. 103(a) as being obvious over Beattie et al (US Patent 5,843,767; 1998), in view of Rauscher (US Patent 4,112,170; 1978), Chan et al (US 2002/0090649 A1), Harding et al (US Patent 3,280,019; 1966), Stern (US 2002/0055102 A1).

The instant claims briefly recite a device (micro-array or -chip) generated from a substrate comprising at least two sides, an array of microwells (comprised of cavities), and porous regions (readable on pores and channels) within each of the microwells. The cavities of the microwells intersect with the porous regions, and form channels through the substrate. In addition, electrodes are positioned within the cavities. Each electrode has the inherent property and/or function of applying an electrical stimulus to the porous regions. Each of the microwells has the inherent property and/or function of forming an ion bridge since liquids and salts can

Art Unit: 1639

flow through the formed channel. In addition, the limitation that the porous region of the device is formed by heating the substrate, which is a product by process limitation and would be obvious over a device with the same structural limitations.

Beattie teaches a microfabricated apparatus for conducting a multiplicity of individual and simultaneous binding reactions as detailed above.

Beatties does not teach a microarray that is specifically derived from a substrate that is based on borosilicate glass. The reference also does not teach the device to comprise the following materials: gold based electrodes, silver epoxy as conductive material coated on the walls of the microwell, and a bar code.

However, Rauscher teaches using borosilicate glass to manufacture a glass body comprising an array of channels. (e.g. Claim 1 of the reference) The reference also teaches the advantages of using borosilicate glass due to its improved leaching characteristics in combination with softening points and thermal expansion coefficients acceptable for fabricating composite glass articles used in the production of channeled bodies. (Column 2, lines 26-33.)

Chan et al teach using electrodes for electronic or electrochemical detection of biomolecules using biochip arrays. The reference specifically teaches the preferred electrode are known in the art and include metals such as aluminum. (Page 7, paragraph 0056 of the reference.) The reference also teaches using hydrophobic insulation layer for the biochip array. (See Figure 9 and 11 of the reference.)

Harding et al teach using silver epoxy as an electrically conductive adhesive on semiconductor chips. (Column 5 lines 4-10) The reference also teaches the advantage of using silver epoxy as an electrically conductive adhesive due to its insolubility in electrophoretic bath.

Art Unit: 1639

Stern teaches a bar code may be imprinted on glass plate for microarray detection and analysis. (Page 11, paragraph [0099]). The reference teaches the advantages of using bar code in microarray such as information linked to an identifier for a microarray can be retrieved.

Therefore, it would have been prima facie obvious for an ordinary skilled artisan to generate a microarray by using porous glass slides with build-in electrodes. Due to the advantages taught by Beattie et al, Rauscher, Chan et al, Harding et al, and Stern, a person of ordinary skill in the art would have been motivated at the time of the invention to manufacture microarrays that are capable of detecting electrochemical signals by using porous glass slides in combination with various coating technologies and electrodes. Each of the components of the device and their applications in microarray or related fields (such as semiconductor industry) are known in the prior art. For example, silver epoxy is known to be a conductive coating material, and can be used in coating microchips as taught by Harding et al. Therefore, an ordinary skilled artisan would have reasonable expectation of success of achieving such modifications.

In conclusion, the invention of the instant claims would have been prima facie obvious over Beattie, in view of Beattie et al, Rauscher, Chan et al, Harding et al, and Stern to one of ordinary skill in the art without evidence to the contrary.

### ***Conclusion***

No claims are allowed.

Art Unit: 1639

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sue Liu whose telephone number is 571-272-5539. The examiner can normally be reached on M-F 9am-3pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Wang can be reached on 571-272-0811. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
**PADMASHRI PONNALURI**  
**PRIMARY EXAMINER**

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Art Unit 1639  
10/13/2005